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states and several excited states of the residual nuclei have been measured at an incident deuteron energy of 14.7 MeV. The emitted alpha particles were detected with a solid state detector of a silicon p-n junction. The alpha particle groups, α_0 of the ground state transitions for all targets and the alpha particle groups of several excited state transitions for F^{19} and S^{32} show pronounced peaks at forward angles and oscillatory behavior in the angular distributions, which were compared, and were in good agreement, with the theory of the two nucleon pickup process. The angular distributions of other alpha particle groups for excited state transitions show nearly symmetrical behavior about 90° and the cross sections of them are smaller by about a factor of 2~5 than those of α_0. These facts suggest that these reactions occur through different process other than the surface direct interaction process, and are consistent with the level structures of residual nuclei predicted from the shell model. The mass number dependence of the integrated cross sections for the ground state transitions was obtained. The values of the cross sections are proportional to the inverse cubes of mass number A and the values of the cross sections for even-even nuclei are larger by about a factor of 3 than those for odd-odd and odd nuclei, in the mass region $14 \leqq A \leqq 32$.

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Determination of cadmium in sea-water. Masayoshi Ishibashi, Tsunenobu Shigematsu, Masayuki Tabushi, Yasuharu Nishikawa and Shiro Goda. *Nippon Kagaku Zasshi*, **83**, 295 (1962), in Japanese.—Quantitative determination of cadmium in sea-water was carried out colorimetrically by 1-(2-pyridyl-azo)-2-naphthol "PAN" method. In 40~60 l. of sea-water, 400~600ml. of conc. HCl and 30mg. of Cu as $CuSO_4$ solution were added. H_2S was passed in and the solution was allowed to stand for 2~3 days. Cadmium in the sample was coprecipitated with CuS nearly completely. The precipitate was filtered and dissolved in 30~50ml. of aqua regia, and the solution was evaporated to dryness. The residue was treated with 10ml. of 0.1N HCl and the solution was introduced onto an ionexchenge column (Dowex 50, 50~100 mesh, 15×125 mm.) at a flow rate of 1 ml./min. Cadmium was separated from copper by eluting with 100 ml. of 0.5N HCl solution. To the effluent, 0.5 ml. of 0.1% PAN solution, 5ml. of 10% NH_4Ac solution and 1.5g. of NaCl were added and Cd-PAN complex formed was extracted with 20 ml. of C_6H_6 at pH 9.5. The absorbance of the resultant colored benzene layer was measured at 555mμ. In this procedure, the recovery of cadmium was found to be about 90%. Cadmium content in the sea-water offshore of Shirahama, Wakayama Pref. and at the coast of Hamadera, Osaka Pref., Japan was found to be 0.08~0.17μg/l: the mean value was 0.1 μg./l. The cadmium content in several marine plants and animals was also determined and found to be in the range from 2.5×10^{-4}% to 18.4×10^{-4}% of its ash samples.

Gallium content in rocks and minerals. Tsunenobu Shigematsu, Yasuharu Nishikawa and Keizo Hiraki. *Nippon Kagaku Zasshi*, **83**, 444 (1962), in Japanese.—Gallium content in 92 samples of rocks and minerals was determined and the

distribution of the element in Japan was discussed. The content in igneous, sedimentary and metamorphic rocks were found to be 15~16g./ton, and no distinct difference was observed among the rocks. The content in several minerals and vermiculites from Ishikawa-cho, Fukushima Prefecture varied in the range from 0 to 180g./ton depending upon the kinds of minerals. The content in alunites from Shokozan, Hiroshima Pref. Japan, agalmatolites from Goto, Nagasaki Pref., Japa and bauxites from various districts were also determined and were found to be 13~53g./ton, 9.5~46g./ton, and 22~85g. /ton, respectively. Gallium contents in the same kinds of minerals showed little differences even when they were of different occurrence.

Solvent extraction of manganese as acetylacetonates. Tsunenobu Shigematsu and Masayuki Tabushi. *Nippon Kagaku Zasshi*, **83**, 814 (1962), in Japanese. The solvent extraction of manganese acetylacetonate was investigated. Manganese can be partially extracted in relatively high pH region. However, the extraction recovery is almost quantitative at pH 8~9.5 in the presence of oxidizing agent such as hydrogen peroxide. Ascorbic acid prevents the extraction of manganese. From these results, it seems that bivalent manganese is not extracted, and manganese extracted is in higher valence state. This is in a good agreement with the behavior of the element presumed from the correlation between the maximum extractability of metal acetylacetonate and the ionic potential of the central metal. By the proposed procedure of the extraction, the separation of manganese from iron (III), nickel and cobalt was also examined.

Determination of beryllium in biomaterials and natural water. Tsunenobu Shigematsu, Masayuki Tabushi and Fumio Isojima. *Bunseki Kagaku*, **11**, 752 (1962), in Japanese.—In order to apply the spectrophotometric acetylacetonate method to the determination of beryllium in sea water, lake water samples and biomaterials, the procedures for the concentration of trace amount of the element, the ashing of the samples and the removal of the disturbing phosphate were studied. As the decomposition of biomaterials, the dry method was examined, and the ashing at 600°C was found to be the best. Beryllium was not lost in this condition. The coprecipitation with ferric hydroxide was used for the concentration of beryllium. Beryllium was quantitatively recovered when the precipitation was carried at pH 7. Phosphate gave a negative error in the determination of beryllium, and so must be removed. The ferric hydroxide coprecipitation method can be used also for the separation of beryllium from phosphate, and it seemed to be better than the ammonium phosphomolybdate procedure. When ferric hydroxide precipitated at pH 11, in the presence of EDTA, beryllium coprecipitated, while phosphate did not contaminate even when calcium was present as in the biomaterials. The following analytical procedures were proposed: Biomaterials ; the dry, powdered sample is ashed in a silica or platinum-crucible, at 600°C, for 3~4 hours. The ash is treated with hydrochloric acid, and with hydrofluoric acid when the sample contains silicates, and the residue is fused with bisulfate. To the resulting slution, ferric chloride and EDTA are added, and hydroxide is formed at pH 11. The precipitate is dissolved with a small amount of hydrochloric acid and appropriate amounts of EDTA and NaCl, after which 0.8m*l* of 5% acetylacetone solution are added. After pH is adjusted

to 7, beryllium acetylacetonate is extracted with 20m*l* of chloroform. The organic layer is washed twice with 50m*l* of 0.1*N* NaOH solution, and absorbance is obtained at 295mμ, against the reagent blank. Natural water sample; To the slightly acidified water sample, ferric chloride solution is added as a carrier, and pH is adjusted to 8 with ammonia. Ferric hydroxide is filtered and dissolved with hydrochloric acid, and then beryllium is determined by the spectrophotometric procedure. When the sample contains silicates, the hydroxide is heated at low temperature, and then treated with hydrofluoric acid to remove any silica. Sea water, lake water samples and several biomaterials such as seaweed were analyzed by the procedure described.

Countercurrent distribution of iron and copper in acetylacetone - butyl acetone system. Tsunenobu Shigematsu and Masayuki Tabushi. *Bull. Inst. Chem. Res., Kyoto Univ.*, **40**, 374 (1962).

Coprecipitation of scandium with calcium oxalate. Tsunenobu Shigematsu, Masayuki Tabushi and Masakazu Matsui. *Bull. Inst. Chem. Res., Kyoto Univ.*, **40**, 381 (1962).

Dibenzoylmethane as a chelating reagent in solvent extraction and spectrophotometric determination. Tsunenobu Shigematsu, Masakazu Tabushi and Tsunehiko Tarumoto. *Bull. Inst. Chem. Res., Kyoto Univ.*, **40**, 388 (1962).

Inorganic Chemistry

Effects of addition of lithia containing glasses on the properties of lithia ceramics. Studies on the thermal shock resisting ceramics of the Li_2O-Al_2O_3-SiO_2 system. I. Megumi Tashiro and Toshio Maki. *Yogyo Kyokai Shi*, **70**, 8 (1962), in Japanese.—Powdered frits of lithia containing glasses were added as the binding agent in a total amount of 5~20% to finely divided natural petalite ($Li_2O \cdot Al_2O_3 \cdot 8SiO_2$). The compositions of glasses were 4 ~ 18 Li_2O, 4 ~ 21 Al_2O_3, 52~86 SiO_2 and 5 ~ 25% (wt) ($MgO + ZrO_2 + P_2O_5$). The mixtures were ball-milled to a finess smaller than 200 mesh, dry pressed under pressure of 900 kg/cm^2 with an addition of 0.05% PVA, formed into bars of 5×5×50mm, and fired at a temperature 1080° ~ 1320°C until the mixture sintered to an apparent porosity of about zero. The results showed that the addition of the glasses produces profound effects in (a) increasing the firing range or the interval between the sintering temperature and the sagging temperature, (b) increasing the modulus of rupture of the sintered bodies, and (c) improving their thermal shock resistance. Among the glasses tested the one having the composition, 10.7Li_2O, 8.9MgO, 8.9Al_2O_3, 71.5% (wt) SiO_2, showed the best results: The firing range was increased from -20°C for the body of 100% petalite ((−) means that the sagging temperature is lower than the sintering temperature and (+) the reversed case) to +40°C for the body containg 10 weight percent of the above glass. The strength of the sintered body was increased by 100%. The specimen of the above size withstood repeated quenchings from 1000°C into